

WHAT IS CLAIMED IS:

1. A valve timing control device comprising:
a rotor,
a housing which can rotate relative to the rotor,
a projecting portion which is formed on the housing so as to slide on the outer circumference of the rotor,
a fluid chamber which is defined between the rotor and the housing,
a vane which is provided on the rotor and which divides the fluid chamber into a retard angle chamber and an advance angle chamber and
a torsion coil spring for urging the rotor relative to the housing in the advance angle direction in which the volume of the retard angle chamber decreases and the volume of the advance angle chamber increases and disposed in the twisted condition with a predetermined angle so as not to contact with the rotor and the housing frictionally.
2. A valve timing control device as recited in Claim 1, wherein the maximum twisted angle of the torsion spring is within 360° .
3. A valve timing control device as recited in Claim 3, wherein one end of the torsion spring is engaged with an first engaging groove formed on a plate connecting to the housing and the other end of the torsion spring is engaged with a second engaging groove formed on the rotor, and the first engaging groove is disposed at the approximately same position with respect to the approximately circumferential center portion of the projection portion which has a maximum circumferential width.
4. A valve timing control device as recited in Claim 3, wherein a first hook portion which is extended outward in the radial direction is formed on one end of a coil portion of the torsion spring and a second hook portion which is extended

outward in the radial direction is formed on the other end of the coil portion of the torsion spring, a first engaging portion which is engaged with the first hook portion is formed in the first receiving groove and a second engaging portion which is engaged with the second hook portion is formed in the second receiving groove, and wherein the first engaging portion is opened on a surface of the plate connecting to the rotor and the second engaging portion is opened on a surface of the rotor connecting to the plate.